L3: Entry 1 of 2 File: JPAB Jul 19, 1994

PUB-NO: JP406199109A
DOCUMENT-IDENTIFIER: JP 06199109 A
TITLE: PNEUMATIC TIRE

PUBN-DATE: July 19, 1994

INVENTOR-INFORMATION:

NAME	COUNTRY
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ASSIGNEE-INFORMATION:

NAME	COUNTRY
BRIDGESTONE CORP	

APPL-NO: JP04349138
APPL-DATE: December 28, 1992

US-CL-CURRENT: 152/209.12
INT-CL (IPC): B60C 11/04; B60C 11/03

ABSTRACT:

PURPOSE: To improve noise property and drainage property on a wet road surface of a pneumatic tire having good driving stability on a dry road surface.

CONSTITUTION: A pneumatic tire partitions its tread 1 into a central area 4 and a pair of side areas 5 on both sides of the central area 4 by a pair of main circumferential grooves 3 separated at least a quarter of the tread width extending in parallel beyond a central circumference 4 and also has a directiveness tread pattern which is the tread partitioned along its circumference by diagonal grooves 6 which cross the main circumferential grooves 3, extend to the central area 4 from each side area 5 diagonally and facing each other, and respectively end at the central area 4. The pneumatic tire also has groove strips of the diagonal grooves 6 increasing their curvature from the side areas 5 toward the central area 4 and having a maximum groove width enlarged near their ends.

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L3: Entry 2 of 2 File: DWPI Jul 19, 1994

DERWENT-ACC-NO: 1994-269203
DERWENT-WEEK: 199433

TITLE: Pneumatic tyre with low pattern noise and high drainage property, maintaining steering stability on dry roads - has main circumferential grooves each distanced from tread centre line dividing tread surface, and slant grooves crossing main grooves in opposite directions

PATENT-ASSIGNEE:

ASSIGNEE	CODE
BRIDGESTONE CORP	BRID

PRIORITY-DATA: 1992JP-0349138 (December 28, 1992)

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PATENT-FAMILY:

	PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
☐	JP 06199109 A	July 19, 1994		006	B60C011/04

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP 06199109A	December 28, 1992	1992JP-0349138	

INT-CL (IPC): B60C 11/03; B60C 11/04

ABSTRACTED-PUB-NO: JP 06199109A
BASIC-ABSTRACT:

Tyre with a directional tread pattern has a couple of main circumferential grooves (3), each distanced from the tread centre line (2) by at least 1/4 times the tread width, dividing the tread surface into the central region (4) and side regions (5), and has many slant grooves (6), which extend from the side region (5) toward the central region (4) crossing the main groove (3) in the opposite directions and which terminate in the central region (4).

Pref., the slant groove (6) has the shape with the curvature increasing from the side region (5) toward the central region (4), and has the max. groove width enlarged near the terminated end. Slant groove (6) specifically has the groove width gradually increasing from the side region (5) toward the central region (4).

ADVANTAGE - Pneumatic tyre with low pattern noise and high drainage property is obtd. maintaining the steering stability on dry roads.

CHOSEN-DRAWING: Dwg.0/5

TITLE-TERMS: PNEUMATIC TYRE LOW PATTERN NOISE HIGH DRAIN PROPERTIES MAINTAIN STEER STABILISED DRY ROAD MAIN CIRCUMFERENCE GROOVE DISTANCE TREAD CENTRE LINE DIVIDE TREAD SURFACE SLANT GROOVE CROSS MAIN GROOVE OPPOSED DIRECTION

DERWENT-CLASS: A95 Q11

CPI-CODES: A12-T01B;

ENHANCED-POLYMER-INDEXING:
Polymer Index [1.1] 017 ; H0124*R Polymer Index [1.2] 017 ; Q9999 Q9256*R Q9212 ; B9999 B3985 B3974 B3963 B3930 B3838 B3747 ; K9416 ; ND01 ; ND09

POLYMER-MULTIPUNCH-CODES-AND-KEY-SERIALS:
Key Serials: 0009 0226 0231 2624 2826 3258

Multipunch Codes: 017 02& 032 04- 41& 50& 551 560 562 651 672 699

SECONDARY-ACC-NO:
CPI Secondary Accession Numbers: C1994-122990
Non-CPI Secondary Accession Numbers: N1994-212194

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(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（Ａ）**　(11)特許出願公開番号

特開平6－199109

(43)公開日　平成６年(1994)７月19日

(51)Int.Cl.[5]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｂ６０Ｃ　11/04		Ｄ　8408－3D		
11/03		Ｚ　8408－3D		

審査請求　未請求　請求項の数２(全　６　頁)

(21)出願番号　特願平4－349138

(22)出願日　平成４年(1992)12月28日

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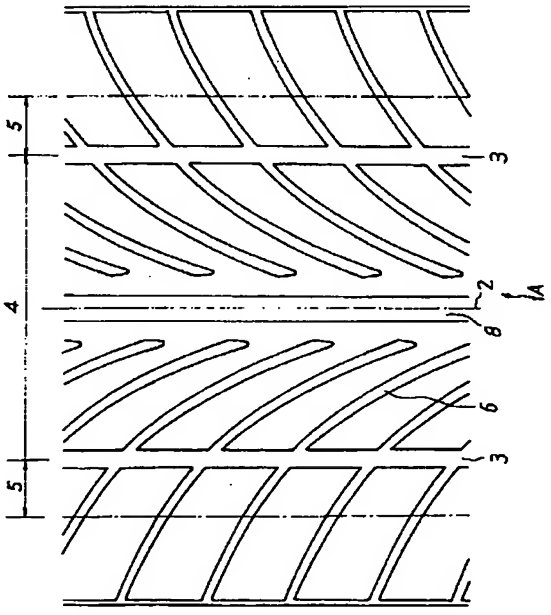
(54)【発明の名称】　空気入りタイヤ

(57)【要約】

【目的】　本発明は、乾いた路面での良好な操縦安定性を有する空気入りタイヤの、騒音性および濡れた路面での排水性を向上させることを目的とする。

【構成】　本発明の空気入りタイヤは、そのトレッド幅の少なくとも四半幅をトレッド１の中央円周２から隔てて並行に延びる一対の主周溝３によってトレッド１をその中央域４とこれを挟む一対の側域５とに区画するとともに、主周溝３と交差して各側域５から互いに向かい合って斜めに中央域４に延び該中央域４にそれぞれ終端する斜め溝６によってトレッド１をその円周に沿って区画した方向性トレッドパターンを有していて、斜め溝６が側域５から中央域４に向かって曲率の増加する溝すじを有し、かつその終端の近傍にて拡大した最大溝幅をもつことを特徴としている。



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【特許請求の範囲】

【請求項１】　タイヤのトレッド幅の少なくとも四半幅をトレッドの中央円周線から隔てて並行に延びる一対の主周溝によってトレッドをその中央域とこれを挟む一対の側域とに区画するとともに、主周溝と交差して各側域から互いに向かい合って斜めに中央域に延び該中央域にそれぞれ終端する斜め溝によってトレッドをその円周に沿って区画した方向性トレッドパターンを有する空気入りタイヤにおいて、

斜め溝が側域から中央域に向かって曲率の増加する溝すじを有し、かつその終端の近傍にて拡大した最大溝幅をもつことを特徴とする空気入りタイヤ。

【請求項２】　斜め溝がトレッドの側域から中央域に向けて漸増する溝幅を有することを特徴とする請求項１に記載の空気入りタイヤ。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、乾いた路面での操縦安定性を低下させることなく、パターンノイズおよび濡れた路面での排水性を良好にした空気入りタイヤに関するものである。

【０００２】

【従来の技術】空気入りタイヤの排水性を向上させるには、トレッドのネガティブ率（トレッド全体に占める溝面積の割合）を大きくすればよいことはわかっているが、その場合、トレッドの陸部剛性が低下するため駆動・制動性等を悪化させる。そのため、ネガティブ率を大きくしないで排水性を高める検討がなされている。

【０００３】例えば、トレッドにその円周に沿って直線上に延びる周溝と、中央域から側域に向けて順次接地域に入る斜め溝とを配設した、いわゆる方向性パターンを有する空気入りタイヤがある（図５）。

【０００４】方向性パターンを有する空気入りタイヤは、一般に濡れた路面を高速で走行した場合、タイヤの前側方への排水性には優れるものの、接地面の周方向長さが両側域対比中央域が長く、特に偏平断面を有するトレッド幅が広いタイヤにおいては接地面内トレッド中央域の水を排除し難く、これが高速走行時でのハイドロプレーニング現象の発生を起こしやすくしてしまう。そのため、この空気入りタイヤでは、トレッド中央域に周溝を配設するのが一般的である。

【０００５】

【発明が解決しようとする課題】しかし、上述した方向性パターンを有する空気入りタイヤは、一般に斜め溝が各側域から中央域に向かい合って斜めに延びる配列であればよく、ノイズの問題を考慮した斜め溝の配設角度や溝幅などの適正化については十分に検討されていなかった。この空気入りタイヤは、中央域に周溝を配設していたが、これは中央域のネガティブ率を大きくするので、排水性にとっては有利となるが、その反面、陸部剛性を

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低下させ乾燥路面での操縦安定性を悪くすることになる。これら性能の両立を図るために鋭意検討を重ねた結果、斜め溝を適正形状で配設するすることにより、中央域に位置する周溝を少なくしても排水性を確保できることがわかった。また、パターンノイズについても、斜め溝の溝幅を変化させることにより低減できることわかった。

【０００６】そこで本発明は、斜め溝の配設形状およびその溝幅の適正化を図ることを課題とし、これによりトレッド中央域の陸部剛性を低下させないで良好な操縦安定性を維持することを前提として低騒音性と高排水性とを有する空気入りタイヤを提供することを目的とする。

【０００７】

【課題を解決するための手段】本発明の空気入りタイヤの一例を図１に示し、図中１はトレッド、２は中央円周線、３は主周溝、４は中央域、５は側域、６は斜め溝である。本発明は、タイヤのトレッド幅の少なくとも四半幅をトレッド１の中央円周線２から隔てて並行に延びる一対の主周溝３によってトレッド１をその中央域４とこれを挟む一対の側域５とに区画するとともに、主周溝３と交差して各側域５から互いに向かい合って斜めに中央域４に延び該中央域４にそれぞれ終端する斜め溝６によってトレッド１をその円周に沿って区画した方向性トレッドパターンを有する空気入りタイヤにおいて、斜め溝６が側域５から中央域４に向かって曲率の増加する溝すじを有し、かつその終端の近傍にて拡大した最大溝幅をもつことを特徴とする空気入りタイヤである。

【０００８】斜め溝６は、各側域５から中央域４の方へ互いに向かい合って凸に曲率が増加する溝すじを有し、斜め溝６の接線と中央円周線２と平行な線との交角が、側域５で４５～８０°の範囲にすることが好ましく、中央域４で２５～４５°の範囲にすることが好ましい。側域５における前記交角が小さすぎると、タイヤの側方への排水性が低下し、大きすぎるとタイヤ接地形状に近似的に一致するためにパターンノイズが悪化する。また中央域５における前記交角が小さすぎると、十分な陸部剛性を得られないためであり、大きすぎると排水性が悪化する。

【０００９】また、斜め溝６は、その終端の近傍にて拡大した最大溝幅を有し、トレッド端位置の溝幅に対する終端の近傍の最大溝幅の割合が、１．１～２．０の範囲であることが好ましい。この割合が１．１未満だと中央域４における十分なネガティブ率が得られず、２．０を超えると中央域４の陸部剛性が低下するためである。また、斜め溝６がトレッドの側域から中央域４に向けて漸増する溝幅を有することがパターンノイズを低減させる上で好ましい。なお溝幅は、溝の接線と直交する方向に測定することとする。

【００１０】空気入りタイヤが良好な排水性を得るためには、トレッドのネガティブ率（総溝面積／（総溝面積

＋総陸部面積）×１００）を３０％以上に設定するのが一般的であるが、本発明では、排水性とパターンノイズとの両立を図るため、斜め溝のネガティブ率を１５％程度に抑えることが好ましい。このため、残りの１５％程度のネガティブ率を主周溝３の配設により確保し、しかも中央域４の陸部剛性も維持することを考慮して、この主周溝３はタイヤのトレッド幅の少なくとも四半幅をトレッド１の中央円周２から隔てて並行に配置した。

【００１１】また、タイヤの接地性を向上させるために、斜め溝６の複数本と逆向きに交差し、各側域５から互いに向かい合って斜めに中央域４に延びトレッド円周に沿う間隔でサイプまたは切込み７を配置してもよい（図２）。

【００１２】より高い排水性が必要である場合は、中央域４に中央溝８を必要に応じ１本（図１）または２本（図２）配設してもよいが、中央域４に位置する斜め溝６の接線と中央円周線２を含む平面との交角が非常に小さい場合は中央主溝８の必要性は乏しい。なお、中央主溝８を設けた場合は、中央域４における陸部剛性確保の点から、斜め溝６は中央主溝８と交差させずに、斜め溝６の終端を陸部内にとどめる配置にする。

【００１３】また、中央域４において、従来の方向性パターンを有するタイヤの主溝の分のネガティブ率を確保し、かつ陸部剛性の低下は最小限に抑えるため、図３に示すように斜め溝６の終端からタイヤの後方接地域となる方向に、トレッド円周を含む平面に対し小さな傾きで主周溝３に近接して延び陸部内に終端する分岐溝９を配置してもよい。さらに、タイヤの側方への排水性を高めるために、トレッド円周に沿って隣接する斜め溝６間に補助斜め溝１０を設けてもよい。この補助斜め溝１０は、分岐溝９と連通してもよいが（図４）、しなくてもよい（図３）。なお、ネガティブ率の不足等を補うために、補助分岐溝１１（図４）や補助周溝１２（図３）を設けてもよい。

【００１４】

【作用】本発明の空気入りタイヤは、斜め溝６を側域５から中央域４に向かって増加する曲率の溝すじにすることにより、トレッド１の中央域４では陸部剛性を低下させることなく排水性を確保することができ、さらに斜め溝６の終端近傍を、拡大した最大溝幅にすることで排水性はいっそう向上する。また、中央域４から側域５にかけて溝幅が実質的に狭くすることでパターンノイズの低減が図れる。さらに、主周溝３を中央円周線２からトレッド幅の少なくとも四半幅に設けることでより高排水性が期待できる。

【００１５】

【実施例】

・実施例１

タイヤサイズがＰＳＲ　２０５／６０Ｒ１５、トレッド幅Ｗが１６０ｍｍである図１に示すトレッド１Ａを有する発明タイヤについて試験を行った。この発明タイヤは、一対の直線上の主周溝３（溝幅：６ｍｍ）を、それぞれトレッド端寄りに斜め溝６と交差し、トレッド円周を含む平面に対して平行に配置した。また、高排水性を得るために中央円周位置に上記平面と平行な一本の直線状の中央溝８（溝幅：９ｍｍ）を配設した。斜め溝６は、各側域５から中央域４の方向に斜めに延び、その方向に上記平面に対する斜め溝６の接線の傾斜角度を漸減しながら互いに向かい合って終端する配置にした。斜め溝６の配設角度は、トレッド円周を含む平面に対し、トレッド端位置で６５°、主周溝位置で５０°、溝の終端位置で２０°とした。なお、中央円周線２を挟んで向かい合う斜め溝は、トレッド円周に沿って隣接する斜め溝６の配設ピッチの半ピッチ（１５ｍｍ）だけ該円周方向にずらして配置した。溝幅は、トレッド端位置で４．０ｍｍ、溝の終端位置で４．５ｍｍとした。なお、本発明では、トレッド以外の構造については従来品を使用した。

【００１６】・実施例２

図２に示すトレッド１Ｂを有する発明タイヤについて試験を行った。この発明タイヤは、二本の中央溝８（溝幅：７ｍｍ）を中央円周線２を挟んで配置し、主周溝３の溝幅を５ｍｍとし、斜め溝６の配設角度を、トレッド円周を含む平面に対し、トレッド端位置で６５°、主周溝位置で５５°、溝の終端位置で２０°とし、その溝幅を、トレッド端位置で３．０ｍｍ、溝の終端位置で４．５ｍｍとし、トレッド円周に沿う間隔で斜め溝６の配設方向とは逆向きにサイプを配設したこと以外は、実施例１に使用した発明タイヤと同じ構造である。

【００１７】・実施例３

図３に示すトレッド１Ｃを有する発明タイヤについて試験を行った。この発明タイヤは、タイヤサイズがＰＳＲ　２２５／５０Ｒ１６、トレッド幅Ｗが２００ｍｍのものを用い、そのトレッド１に一本の中央主溝８（溝幅：１０ｍｍ）を中央円周位置に有し、主周溝の溝幅を８ｍｍとした。斜め溝６は、その終端の近傍に拡大した最大溝幅（７ｍｍ）を有し、斜め溝６の配設角度を、トレッド円周を含む平面に対し、トレッド端位置で７０°、溝の終端位置近傍で６０°とした。また斜め溝６の終端からタイヤの後方接地域となる方向に、トレッド円周を含む平面に対し曲率をもちながら主周溝３に漸近して延び陸部内で行き止まりになる分岐溝９を配置し、この分岐溝９の溝幅を、斜め溝６との終端位置で７ｍｍ、分岐溝９の末端で３ｍｍとした。その他に、トレッド円周に沿って隣接する斜め溝６の配設ピッチの半ピッチ位置の側域５に、斜め溝６と実質上平行な補助斜め溝１０を、また側域５のほぼ中央に補助周溝１２をトレッド円周に沿って配設した。上記以外の構造については、実施例１に使用した発明タイヤと同じ構造である。

【００１８】・実施例４

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図4に示すトレッド1Dを有する発明タイヤについて試験を行った。この発明タイヤは、タイヤサイズがPSR 225／50R16、トレッド幅Wが200mmのものを用い、そのトレッド1に一本の中央溝8（溝幅：4mm）を中央円周位置に有し、主周溝3の溝幅を6mmとした。斜め溝6は、その終端の近傍に拡大した最大溝幅（8mm）を有し、斜め溝6の配設角度を、トレッド円周を含む平面に対し、トレッド端位置で70°、溝の終端位置近傍で55°とした。また斜め溝6の終端からタイヤの後方接地域となる方向に直線上で先細に延びる分岐溝9を有し、この分岐溝9の配設角度は、トレッド円周を含む平面に対して、中央円周寄りで14°、主周溝寄りで11°とし、溝幅を、斜め溝6の終端位置で8mm、分岐溝9の末端で5mmとした。その他に、トレッド円周に沿って隣接する斜め溝6の配設ピッチの半ピッチ位置の側域5から斜め溝6と実質上平行に延びて分岐溝9に連通する補助斜め溝10を備え、また側域5に位置する補助斜め溝10から分岐してタイヤの後続接地方向へ延び斜め溝6と交差して陸部内で終端する補助分岐溝11を備えている。上記以外の構造については、実施例1に使用した発明タイヤと同じ構造である。

【0019】・従来例

図4に示すトレッド11を有する従来タイヤであって、＊

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＊それ以外の構造は実施例1に使用した発明タイヤと同じである。なお、タイヤサイズはPSR 205／65R15およびPSR 225／50R16の二種類のものを用いた。

【0020】・試験方法

上記した図1～図5に示すトレッドを有する空気入りタイヤについて、タイヤ内圧が2．0kgf／cm2、タイヤ負荷荷重が実車2名乗車相当の条件の下に、濡れた路面での排水性と、乾いた路面での操縦安定性およびパターンノイズとについての試験を行った。排水性は、水深6mmの濡れた路面を走行した際のタイヤ接地面の残存面積を計測して評価した。操縦安定性は、乾いた状態のサーキットコースを各種走行モードによりスポーツ走行したときのテストドライバーのフィーリング評価で行った。パターンノイズは、直線平滑路面を時速100km／hで惰行したときの車内音のフィーリング評価で行った。

【0021】・試験結果

表1及び表2に試験結果を示す。表中の数値はいずれの試験も従来例を100とした指数対比で表していて、この値はいずれも大きいほど優れている。

【0022】

【表1】

	従来例	実施例1	実施例2
排水性	100	110	115
パターンノイズ	100	115	120
操縦安定性	100	97	95

【0023】

※　※【表2】

	従来例	実施例3	実施例4
排水性	100	105	110
パターンノイズ	100	105	105
操縦安定性	100	105	100

【0024】これらの試験結果から、発明タイヤは、従来タイヤに比べ、濡れた路面での排水性及びパターンノイズの性能が優れていて、しかも乾いた路面での操縦安定性もほぼ同等もしくは同等以上である。

【0025】

【発明の効果】本発明によれば、斜め溝の配設角度をトレッドの中央域にてトレッド円周を含む平面に対し小さくし、かつその溝幅を大きくすることにより、該域でのパターンノイズを悪化させずに十分な排水性が得られ、また、トレッドの両側域にて上記平面に対し斜め溝の配設角度を大きくし、かつ斜め溝の溝幅を小さくすることで、該域での排水性を悪化させることなく、パターンノ★イズの大幅な低減が図れる。以上のことから、本発明は、乾いた路面での操縦安定性を低下させることなく、低パターンノイズおよび濡れた路面での高排水性を備える空気入りタイヤの提供を実現可能にしたのである。

【図面の簡単な説明】

【図1】実施例1に使用した本発明空気入りタイヤのトレッド1Aを示す。

【図2】実施例2に使用した本発明空気入りタイヤのトレッド1Bを示す。

【図3】実施例3に使用した本発明空気入りタイヤのトレッド1Cを示す。

【図4】実施例4に使用した本発明空気入りタイヤのト

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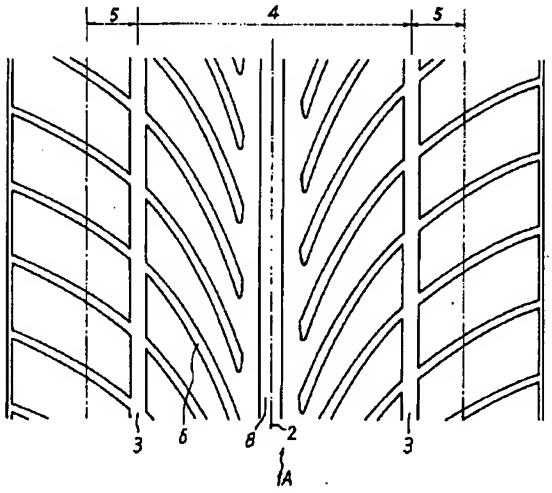
レッド１Ｄを示す。

【図５】従来例に使用した従来タイヤのトレッド１Ｅを示す。

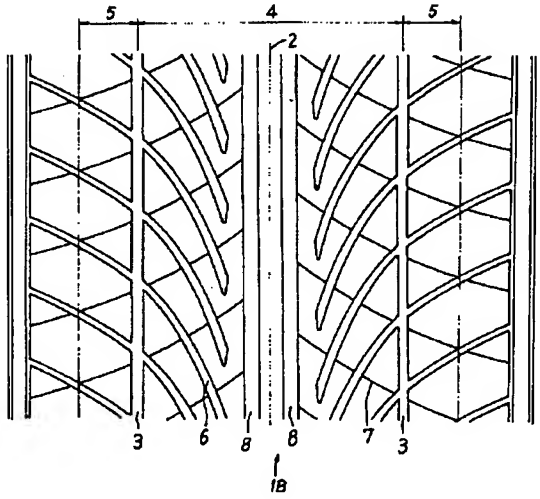
【符号の説明】

1A, 1B, 1C, 1D, 1E　トレッド
2　中央円周線
3　主周溝
4　中央域
5　側域
6　斜め溝
7　サイプ
8　中央溝
9　分岐溝
10　補助斜め溝
11　補助分岐溝
12　補助周溝
13　周溝
W　トレッド幅

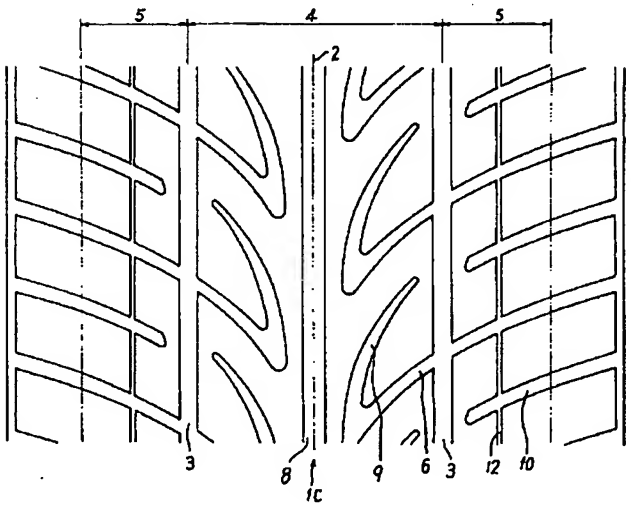
【図１】



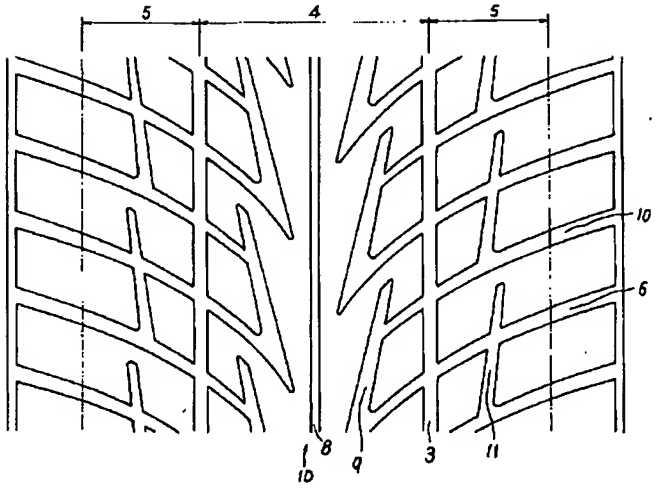
【図２】



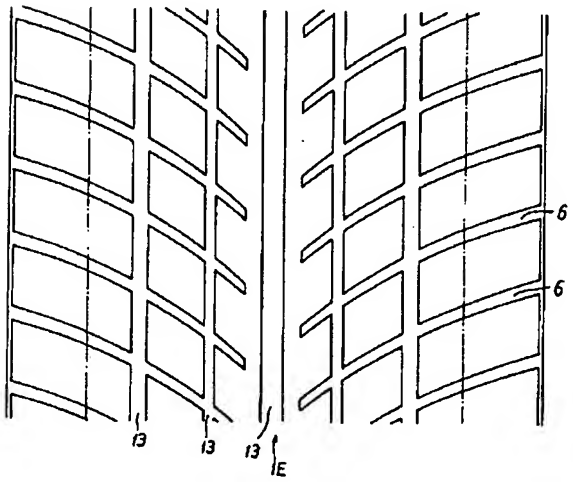
【図３】



【図4】



【図5】



* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the pneumatic tire which made good a pattern noise and wastewater nature in the wet road surface, without reducing the driving stability in the dry road surface.
[0002]
[Description of the Prior Art] Although, as for what is necessary being just to enlarge, the rate of a negative of a tread (the groove surface product occupied in the whole tread comparatively) is known in order to raise the wastewater nature of a pneumatic tire, since the land part rigidity of a tread falls in that case, drive / braking nature etc. is worsened. Therefore, examination which raises wastewater nature without enlarging the rate of a negative is made.
[0003] For example, there is a pneumatic tire which has the so-called directivity pattern which arranged the circumferential groove prolonged on a straight line in accordance with the periphery in a tread and the slanting slot which goes into a sequential touch-down region towards a lateral area from a central region (drawing 5).
[0004] Although the pneumatic tire which has a directivity pattern is excellent in the wastewater nature to the front side of a tire when it runs the road surface which generally got wet at high speed, a both-sides region contrast central region has the long hoop direction die length of a ground plane, and in a tire with the wide tread width of face which has especially a flattened section, it is hard to eliminate the water of the tread central region in a ground plane, and this will be [generating of hydroplaning in the time of high-speed transit] lifting-easy, and will carry out it. Therefore, it is common to arrange a circumferential groove in a tread central region in this pneumatic tire.
[0005]
[Problem(s) to be Solved by the Invention] However, rationalization in consideration of the problem of a noise of the arrangement include angle of a slanting slot, a flute width, etc. was not fully considered that the pneumatic tire which has the directivity pattern mentioned above should just be an array to which a slanting slot faces a central region and generally extends aslant from each lateral area. Although this pneumatic tire was arranging the circumferential groove in the central region, since this enlarges the rate of a negative of a central region, for wastewater nature, it becomes advantageous, but on the other hand land part rigidity will be reduced and it will worsen driving stability in a desiccation road surface. In order to aim at coexistence of these engine performance, as a result of repeating examination wholeheartedly, by arranging a slanting slot in a proper configuration showed that wastewater nature was securable, even if it lessened the circumferential groove located in a central region. Moreover, decreasing [it / by changing the flute width of a slanting slot]-also about pattern noise ********.
[0006] Then, this invention makes it a technical problem to attain rationalization of the arrangement configuration of a slanting slot, and its flute width, and aims at offering the pneumatic tire which has low noise nature and high wastewater nature on the assumption that good driving stability is maintained without reducing the land part rigidity of a tread central region by this.
[0007]
[Means for Solving the Problem] An example of the pneumatic tire of this invention is shown in drawing 1 , and, for a central periphery line and 3, as for a central region and 5, the main circumferential groove and 4 are [one in drawing / a tread and 2 / a lateral area and 6] slanting slots. While this invention divides a tread 1 to the central region 4 and the lateral area 5 of the pair which sandwiches this by the main circumferential groove 3 of the pair which separates at least 4 half width of the tread width of face of a tire from the central periphery line 2 of a tread 1, and is prolonged in parallel

In the pneumatic tire which has the directivity tread pattern which divided the tread 1 in accordance with the periphery by the slanting slot 6 which intersects the main circumferential groove 3, faces mutually from each lateral area 5, extends aslant in the central region 4, and carries out termination to this central region 4, respectively It is the pneumatic tire characterized by the slanting slot 6 having the maximum flute width which has ****** which curvature increases from a lateral area 5 toward the central region 4, and was expanded near the termination.

[0008] As for the slanting slot 6, it is desirable that have ****** which faces the direction of the central region 4 mutually from each lateral area 5, and curvature increases to a convex, and the crossing angle of the tangent of the slanting slot 6, the central periphery line 2, and an parallel line makes it the range of 45-80 degrees in a lateral area 5, and it is desirable to make it the range of 25-45 degrees in the central region 4. If said crossing angle in a lateral area 5 is too small, the wastewater nature to the side of a tire will fall, and since it is in agreement with a tire touch-down configuration in approximation if too large, a pattern noise gets worse. Moreover, it is because sufficient land part rigidity cannot be acquired if said crossing angle in the central region 5 is too small, and if too large, wastewater nature will get worse.

[0009] Moreover, the slanting slot 6 has the maximum flute width expanded near the termination, and it is desirable that it is [of the maximum flute width near the termination to the flute width of tread end position] the range of 1.1-2.0 comparatively. When sufficient rate of a negative in the central region 4 will not be obtained if this rate is less than 1.1, but 2.0 is exceeded, it is for the land part rigidity of the central region 4 to fall. Moreover, it is desirable when having the flute width which the slanting slot 6 increases gradually towards the central region 4 from the lateral area of a tread reduces a pattern noise. In addition, suppose that a flute width is measured in the direction which intersects perpendicularly with the tangent of a slot.

[0010] In order for a pneumatic tire to obtain good wastewater nature, it is common to set up the rate of a negative of a tread (the total groove surface product /(the total groove surface product + total land part area) x 100) to 30% or more, but in order to aim at coexistence with wastewater nature and a pattern noise in this invention, it is desirable to stop the rate of a negative of a slanting slot to about 15%. For this reason, about 15% of the remaining rates of a negative were secured by arrangement of the main circumferential groove 3, in consideration of moreover maintaining the land part rigidity of the central region 4, at least 4 half width of the tread width of face of a tire was separated from the central periphery 2 of a tread 1, and this main circumferential groove 3 has arranged it in parallel.

[0011] Moreover, in order to raise the road-hugging of a tire, two or more and the reverse sense of the slanting slot 6 are intersected, and SAIPU or infeed 7 may be arranged at spacing which faces mutually from each lateral area 5, is prolonged aslant in the central region 4, and meets a tread periphery (drawing 2).

[0012] When a crossing angle with the flat surface which includes the central slot 8 for 1 (drawing 1) or the tangent of the slanting slot 6 located in the central region 4 although 2 (drawing 2) arrangement may be carried out, and the central periphery line 2 in the central region 4 if needed when higher wastewater nature is required is very small, the need for the central major groove 8 is scarce. In addition, when the central major groove 8 is formed, the slanting slot 6 makes termination of the slanting slot 6 the arrangement stopped in a land part from the point of the land part rigidity reservation in the central region 4, without making the central major groove 8 intersect.

[0013] Moreover, the small branching slot 9 which inclines and comes out, approaches the main circumferential groove 3, is prolonged, and carries out termination into a land part may arrange to the flat surface which includes a tread periphery in the direction which serves as a back touch-down region of the termination of the slanting slot 6 to a tire as it is shown in drawing 3 , in order to suppress the fall of land part rigidity securing [and] the rate of the negative of the part of the major groove of the tire which has the conventional directivity pattern in the central region 4 to the minimum. Furthermore, in order to raise the wastewater nature to the side of a tire, the auxiliary slanting slot 10 may be formed between the slanting slots 6 which adjoin in accordance with a tread periphery. Although it may be open for free passage with the branching slot 9 (drawing 4), it is not necessary to carry out this auxiliary slanting slot 10 (drawing 3). In addition, in order to compensate lack of the rate of a negative etc., the auxiliary branching slot 11 (drawing 4) and the auxiliary circumferential groove 12 (drawing 3) may be formed.

[0014]

[Function] When the pneumatic tire of this invention makes the slanting slot 6 ****** of the curvature which increases from a lateral area 5 toward the central region 4, in the central region 4 of a tread 1, wastewater nature can be secured without reducing land part rigidity, and wastewater nature improves further by making it further the maximum flute width to which it expanded near the termination of the slanting slot 6. Moreover, reduction of a pattern noise can be

aimed at because apply to a lateral area 5 from the central region 4 and a flute width narrows substantially. Furthermore, high wastewater nature is more expectable by forming the main circumferential groove 3 in at least 4 half width of tread width of face from the central periphery line 2.

[0015]

[Example]

- Example 1 tire size examined about PSR 205 / 60R15, and the invention tire into which the tread width of face W has tread 1A shown in drawing 1 which is 160mm. This invention tire intersected the slanting slot 6 at tread edge approach, respectively in the main circumferential groove 3 (flute width: 6mm) on the straight line of a pair, and has been arranged in parallel to a flat surface including a tread periphery. Moreover, in order to obtain high wastewater nature, the central slot 8 (flute width: 9mm) of the shape of one straight line parallel to the above-mentioned flat surface was arranged in the central periphery location. The slanting slot 6 extended aslant in the direction of the central region 4 from each lateral area 5, and dwindling whenever [tilt-angle / of the tangent of the slanting slot 6 to the above-mentioned flat surface] in the direction, it faced mutually and it was made the arrangement which carries out termination. The arrangement include angle of the slanting slot 6 was made into 20 degrees in 50 degrees and the termination location of a slot in 65 degrees and the main circumferential groove location to the flat surface including a tread periphery in tread end position. In addition, the slanting slot which faces each other on both sides of the central periphery line 2 has shifted and arranged only the half-pitch (15mm) of the arrangement pitch of the slanting slot 6 which adjoins in accordance with a tread periphery to this circumferencial direction. The flute width was set to 4.5mm in 4.0mm and the termination location of a slot in tread end position. In addition, in this invention, elegance was conventionally used about structures other than a tread.

[0016] - It examined about the invention tire which has tread 1B shown in example 2 drawing 2 . This invention tire arranges two central slots 8 (flute width: 7mm) on both sides of the central periphery line 2. As opposed to the flat surface which sets the flute width of the main circumferential groove 3 to 5mm, and includes a tread periphery for the arrangement include angle of the slanting slot 6 It considers as 20 degrees in 55 degrees and the termination location of a slot in 65 degrees and the main circumferential groove location in tread end position. With the arrangement direction of the slanting slot 6, it is the same structure as the invention tire used for the example 1 at spacing which sets the flute width to 4.5mm in 3.0mm and the termination location of a slot in tread end position, and meets a tread periphery except having arranged SAIPU in the reverse sense.

[0017] - It examined about the invention tire which has tread 1C shown in example 3 drawing 3 . Tire size has one central major groove 8 (flute width: 10mm) in that tread 1 in a central periphery location using PSR 225 / 50R16, and the thing whose tread width of face W is 200mm, and this invention tire set the flute width of the main circumferential groove to 8mm. The slanting slot 6 has the maximum flute width (7mm) expanded near the termination, and made 60 degrees the arrangement include angle of the slanting slot 6 70 degrees and near the termination location of a slot to the flat surface including a tread periphery in tread end position. Moreover, the branching slot 9 which carries out asymptotic to the main circumferential groove 3, extends, and becomes the dead end within a land part has been arranged having curvature in the direction which serves as a back touch-down region of a tire from the termination of the slanting slot 6 to a flat surface including a tread periphery, and the flute width of this branching slot 9 was set to 3mm at the end of 7mm and the branching slot 9 in the termination location with the slanting slot 6. in addition, the lateral area 5 of the half-pitch location of the arrangement pitch of the slanting slot 6 which adjoins in accordance with a tread periphery -- a slanting slot 6 and parenchyma top -- the parallel auxiliary slanting slot 10 -- moreover, the lateral area 5 -- the auxiliary circumferential groove 12 was mostly arranged in the center in accordance with the tread periphery. It is the structure same about structures other than the above as the invention tire used for the example 1.

[0018] - It examined about the invention tire which has tread 1D shown in example 4 drawing 4 . Tire size has one central slot 8 (flute width: 4mm) in that tread 1 in a central periphery location using PSR 225 / 50R16, and the thing whose tread width of face W is 200mm, and this invention tire set the flute width of the main circumferential groove 3 to 6mm. The slanting slot 6 has the maximum flute width (8mm) expanded near the termination, and made 55 degrees the arrangement include angle of the slanting slot 6 70 degrees and near the termination location of a slot to the flat surface including a tread periphery in tread end position. Moreover, it had the branching slot 9 which extends on a straight line at a taper in the direction which serves as a back touch-down region of a tire from the termination of the slanting slot 6, and to the flat surface including a tread periphery, the arrangement include angle of this branching slot 9 was made into 11 degrees by 14 degrees and the main circumferential groove approach by central periphery approach,

and set the flute width to 5mm at the end of 8mm and the branching slot 9 in the termination location of the slanting slot 6. In addition, it has the auxiliary branching slot 11 which branches from the auxiliary slanting slot 10 which is equipped with the auxiliary slanting slot 10 which extends in the slanting slot 6 and a real Kamitaira line from the lateral area 5 of the half-pitch location of the arrangement pitch of the slanting slot 6 which adjoins in accordance with a tread periphery, and is open for free passage into the branching slot 9, and is located in a lateral area 5, extends in the consecutiveness touch-down direction of a tire, intersects a slanting slot 6, and carries out termination within a land part. It is the structure same about structures other than the above as the invention tire used for the example 1.

[0019] - It is a tire conventionally which has the tread 11 shown in conventional example drawing 4 , and the other structure is the same as the invention tire used for the example 1. In addition, tire size used two kinds of things of PSR 205 / 65R15 and PSR 225 / 50R16.

[0020] - About the pneumatic tire which has the tread shown in drawing 1 which carried out the test-method above - drawing 5 , tire internal pressure performed the trial about the wastewater nature in the road surface to which 2.0 kgf/cm2 and a tire load load got wet under the conditions of real vehicle binary-name entrainment, the driving stability in the dry road surface, and a putter noise. Wastewater nature measured and evaluated the residual area of the tire ground plane at the time of running the wet road surface with a depth of 6mm. Driving stability was performed by feeling evaluation of the test driver when carrying out sport transit of the circuit course in the condition of having got dry, with various transit modes. The pattern noise performed the straight-line smooth road surface by feeling evaluation of the sound in the car when coasting by speed per hour 100 km/h.

[0021] - A test result is shown in the trial result table 1 and Table 2. Any trial expresses the numeric value of front Naka with the characteristic contrast to which the conventional example was set to 100, and each of this value is excellent, so that it is large.

[0022]

[Table 1]

	従来例	実施例 1	実施例 2
排水性	100	110	115
パターンノイズ	100	115	120
操縦安定性	100	97	95

[0023]

[Table 2]

	従来例	実施例 3	実施例 4
排水性	100	105	110
パターンノイズ	100	105	105
操縦安定性	100	105	100

[0024] The driving stability in the road surface which the invention tire is excellent in the wastewater nature in the road surface which got wet compared with the tire conventionally, and the engine performance of a pattern noise, and moreover got dry from these test results is also an EQC or more than an EQC mostly.

[0025]

[Effect of the Invention] By according to this invention, making the arrangement include angle of a slanting slot small to the flat surface which includes a tread periphery in the central region of a tread, and enlarging the flute width Sharp reduction of a pattern noise can be aimed at by sufficient wastewater nature being obtained, without worsening the pattern noise in this region, enlarging the arrangement include angle of a slanting slot to the above-mentioned flat surface in the both-sides region of a tread, and making the flute width of a slanting slot small, without worsening the wastewater nature in this region. From the above thing, this invention offered realizable the pneumatic tire equipped

with a low pattern noise and the high wastewater nature in the wet road surface, without reducing the driving stability in the dry road surface.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
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CLAIMS

[Claim(s)]
[Claim 1] While dividing a tread to the central region and the lateral area of the pair which sandwiches this by the main circumferential groove of the pair which separates at least 4 half width of the tread width of face of a tire from the central periphery line of a tread, and is prolonged in parallel In the pneumatic tire which has the directivity tread pattern which divided the tread in accordance with the periphery by the slanting slot which intersects the main circumferential groove, faces mutually from each lateral area, extends aslant in a central region, and carries out termination to this central region, respectively The pneumatic tire characterized by a slanting slot having the maximum flute width which has ****** which curvature increases from a lateral area toward a central region, and was expanded near the termination.
[Claim 2] The pneumatic tire according to claim 1 characterized by having the flute width which a slanting slot increases gradually towards a central region from the lateral area of a tread.

[Translation done.]